Exelon Generation.

Clinton Power Station
8401 Power Road
Clinton, IL 61727

U-604508
October 1, 2019

10 CFR 50.73
SRRS 5A.108

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Clinton Power Station, Unit 1
Facility Operating License No. NPF-62
NRC Docket No. 50-461

Subject: Licensee Event Report 2019-002-00

Enclosed is Licensee Event Report (LER) 2019-002-00: Turbine Driven Reactor Feed Pump Hydraulic Control Failure Results in Automatic SCRAM. This report is being submitted in accordance with the requirements of 10 CFR 50.73.

There are no regulatory commitments contained in this report.

Should you have any questions concerning this report, please contact Mr. Dale Shelton, Regulatory Assurance Manager, at (217) 937-2800.

Respectfully,

Theodore R. Stoner
Site Vice President
Clinton Power Station

Attachment: Licensee Event Report 2019-002-00

cc:

Regional Administrator - Region III
NRC Senior Resident Inspector - Clinton Power Station
Office of Nuclear Facility Safety - Illinois Emergency Management Agency

IE22
NRR

NRC FORM 366 (04-2018)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 03/31/2020

Estimated burden per response to comply with this mandatory collection request 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)

1. Facility Name	2. Docket Number	3. Page
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4. Title

Turbine Driven Reactor Feed Pump Hydraulic Control Failure Results in Automatic SCRAM

5. Event Date			6. LER Number			7. Report Date			8. Other Facilities Involved	
Month	Day	Year	Year	Sequential Number	Rev No	Month	Day	Year	Facility Name	Docket Number
08	03	2019	2019	- 002	- 00	10	01	2019		05000
									Facility Name	Docket Number 05000

9. Operating Mode	11. This Report Is Submitted Pursuant to the Requirements of 10 CFR §: *(Check all that apply)*			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☒ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
10. Power Level	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
098	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☒ 50.73(a)(2)(v)(C)	☐ 73.77(a)(1)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☒ 50.73(a)(2)(v)(D)	☐ 73.77(a)(2)(i)
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(ii)
	[redacted]	☐ 50.73(a)(2)(i)(C)	☐ Other (Specify in Abstract below or in NRC Form 366A)	

12. Licensee Contact for this LER

Licensee Contact	Telephone Number (Include Area Code)
Mr. Dale Shelton, Regulatory Assurance Manager	(217) 937-2800

13. Complete One Line for each Component Failure Described in this Report

Cause	System	Component	Manufacturer	Reportable to ICES	[redacted]	Cause	System	Component	Manufacturer	Reportable to ICES
B	SJ	P	GE	Y						

14. Supplemental Report Expected	15. Expected Submission Date	Month	Day	Year
☐ Yes (If yes, complete 15. Expected Submission Date) ☒ No				

Abstract (Limit to 1400 spaces, i.e., approximately 14 single-spaced typewritten lines)

On August 3, 2019, at 0226 CDT, while operating at approximately 98% power, the Turbine Driven Reactor Feed Pump (TDRFP) B horizontal hardware connection to the Linear Variable Differential Transformer (LVDT) failed causing loss of feedback to the feedwater control system. Flow from TDRFP B decreased while TDRFP A flow increased and reactor level decreased to the scram setpoint, which caused an automatic Reactor Protection System (RPS) scram. All control rods fully inserted. The reactor water Level 2 setpoint was reached and High Pressure Core Spray (HPCS), Reactor Core Isolation Cooling (RCIC), Division 3 diesel generator, Standby Gas Treatment Systems A and B, and all safety related shutdown service water pumps started as expected. RCIC and HPCS injected as expected. All Level 2 containment isolation valves closed as expected. As a result of automatic isolation of the containment ventilation system, the Primary Containment to Secondary Containment and the Drywell to Primary Containment differential pressure limits were exceeded. The cause of the event was the design of the horizontal connecting hardware to the TDRFP B operating cylinder position LVDT was not adequate to withstand cyclic loading. The failed LVDT was replaced on TDRFP B, along with associated horizontal connecting hardware. A design change will be developed and installed to strengthen the connecting hardware to the TDRFP B operating cylinder LVDT such that it is adequate to withstand cyclic loading. This event is reportable under 10 CFR 50.73(a)(2)(iv)(A), 10 CFR 50.73(a)(2)(v)(D), 10 CFR 50.73(a)(2)(ii)(B), and 10 CFR 50.73(a)(2)(v)(C).

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PLANT AND SYSTEM IDENTIFICATION

General Electric -- Boiling Water Reactor, 3473 Megawatts Thermal Rated Core Power
Energy Industry Identification System (EIIS) codes are identified in text as [XX].

EVENT IDENTIFICATION

Turbine Driven Reactor Feed Pump Hydraulic Control Failure Results in Automatic SCRAM

A. Plant Operating Conditions Before the Event

Unit: 1	Event Date: August 3, 2019	Event Time: 0226
Mode: 1	Mode Name: Power Operation	Reactor Power: 098

B. Description of Event

On August 3, 2019, at 0226 CDT, while operating at approximately 98% power, the Turbine Driven Reactor Feed Pump [SJ-P] (TDRFP) B horizontal hardware connection to Linear Variable Differential Transformer (LVDT) 1ZT-FW199 failed causing loss of LVDT feedback to the feedwater control system for TDRFP B. Flow from TDRFP B began decreasing due to the control system reducing speed demand in response to the LVDT failure. TDRFP A [SJ-P] speed and flow increased to maximum and reactor water level decreased to the scram setpoint within 15 seconds, which caused an automatic Reactor Protection System (RPS) scram. Operators placed the reactor mode switch in shutdown and completed the scram response actions.

All control rods fully inserted. Due to the failure mode of TDRFP B (i.e., the pump slowed but did not trip), a trip of the feed pump was not sensed by the Reactor Recirculation [AD] (RR) flow control valve [FCV] runback circuitry. With TDRFP A injecting post scram, reactor water level continued to lower to below the Level 2 setpoint. When the reactor water Level 2 setpoint was reached during the event, the High Pressure Core Spray (HPCS) system [BG], Reactor Core Isolation Cooling (RCIC) system [BN], Division 3 diesel generator [DG] (DG), Standby Gas Treatment Systems [BH] A and B, and all safety related shutdown service water pumps [BI-P] started as expected. RCIC and HPCS injected as expected. All reactor water Level 2 containment isolation signals [JM] occurred as expected and all associated containment isolation valves [ISV] closed as expected.

Following automatic initiation of HPCS as described above, the system was manually secured using station procedures after verification that additional Reactor Pressure Vessel [RPV] (RPV) injection was no longer required. The Primary Containment to Secondary Containment and the Drywell to Primary Containment differential pressure Technical Specification (TS) limits were exceeded as a

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result of the reactor water Level 2 containment isolation of the containment ventilation system. The Primary Containment to Secondary Containment and the Drywell to Primary Containment differential pressure were restored to within TS limits at 1505 hours on August 3, 2019, within the TS action time limits.

C. Cause of the Event

The cause of this event was the design of the horizontal connecting hardware to the TDRFP B operating cylinder position LVDT was not adequate to withstand cyclic loading.

D. Safety Consequences

This event is reportable under 10 CFR 50.73(a)(2)(iv)(A), any event or condition that resulted in manual or automatic actuation of any of the systems listed in Section (a)(2)(iv)(B), specifically RPS, HPCS, and the Division 3 DG.

There were no safety consequences associated with the event described in this report. All plant equipment functioned as designed in response to the loss of LVDT feedback to the feedwater control system for TDRFP B. The unit entered Mode 3 upon the scram and all TS Limiting Conditions for Operation Required Actions were met throughout the event until the Primary Containment to Secondary Containment and the Drywell to Primary Containment differential pressures were restored. Secondary Containment vacuum remained within limits throughout this event, filtering any potential leakage from the Primary Containment in the event of an accident. This condition is reportable under 10 CFR 50.73(a)(2)(ii)(B), any event or condition that results in the nuclear power plant being in an unanalyzed condition that significantly degrades plant safety, due to Primary Containment to Secondary Containment and the Drywell to Primary Containment differential pressure TS limits being exceeded; and 10 CFR 50.73(a)(2)(v)(C), any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to control the release of radioactive material.

As described above, following automatic initiation of HPCS, the system was manually secured using station procedures after verification that additional RPV injection was no longer required. Securing HPCS injection prevents auto restart of the system in the event of a subsequent low RPV level condition, rendering it inoperable. As the HPCS system is considered a single train safety system, this meets the reportability requirements of 10 CFR 50.73(a)(2)(v)(D), any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident. The HPCS system remained available to restore RPV level manually as directed by operating procedure.

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E. Corrective Actions

(1) The failed LVDT was replaced on TDRFP B, along with associated horizontal connecting hardware.

(2) A design change will be developed and installed to strengthen the connecting hardware to the TDRFP B operating cylinder LVDT such that it is adequate to withstand long-term cyclic loading.

F. Previous Similar Occurrences

There were no previous events identified involving failure of connecting hardware to LVDTs similar to the occurrence described in this licensee event report.

G. Component Failure Data

Manufacturer: RBC Bearings
Component Type: Spherco TRE3 Spherical Rod End